UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/693,251	10/20/2000	Lorenzo Vicisano	112025-0178	8214

7590 08/18/2004

A. Sidney Johnston
Cesari and McKenna, LLP
88 Black Falcon Avenue
Boston, MA 02210

EXAMINER	
KADING, JOSHUA A	
ART UNIT	PAPER NUMBER
2661	6

DATE MAILED: 08/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/693,251	VICISANO ET AL.
	Examiner	Art Unit
	Joshua Kading	2661

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 June 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 4-78* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, and 4-78* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 32-36, 38-44, and 46 are rejected under 35 U.S.C. 102(e) as being anticipated by Wesley et al. (U.S. Patent 6,693,907 B1).

Regarding claim 32, Wesley discloses "a router controlling congestion on links attached to the router, said router comprising:

a plurality of ports (figure 1, node 14b for example has a plurality of ports as indicated by the input/output paths to the node);

a first port of said plurality of ports for receiving a data packet (figure 1, node 14b shows a first port entering node 14b from node 12);

a second port of said plurality of ports for transmitting said data packet (figure 1, node 14b shows a second port connected to node 14d);

a receiver to receive an incoming loss report message on said second port (figure 3 shows a generic node of figure 1 where the network interface 20d receives/transmits data, the loss report message, the value of the retransmission count,

is transmitted with the packet as read in col. 8, lines 42-45 to the node, which is then used to update the RX-RPC);

a processor configured to determine loss of packets on selected ports of said plurality of ports, (figure 3, element 20c shows a processor used in a node and the determination of a loss of packets occurs as seen in figure 7, element 128), said processor being further configured to calculate, in response to said incoming loss report message and said loss of packets, a loss rate statistic (figure 3, element 20c shows a processor used in calculating a loss rate statistic, or the loss metric discussed in col. 10, lines 10-14);

a transmitter to transmit an outgoing loss report message through said first port, said outgoing loss report message containing a field having said loss rate statistic written therein (figure 3, element 20d works as a transmitter and receiver to send and receive data from the network, further the child nodes of figure 1 send the loss statistic data to the parent node of figure 1, support for this is read in col. 9, lines 29-32)."

Regarding claim 33, Wesley discloses "a router controlling congestion on links attached to the router, said router comprising:

a plurality of ports (figure 1, node 14b for example has a plurality of ports as indicated by the input/output paths to the node);

a first port of said plurality of ports for receiving a data packet (figure 1, node 14b shows a first port entering node 14b from node 12 which is capable of receiving a data packet);

a second port of said plurality of ports for transmitting said data packet in a downstream direction (figure 1, node 14b shows a second port connected to node 14d which is downstream as defined in col. 1, lines 28-33);

a processor configured to determine loss of packets on selected ports of said plurality of ports, (figure 3, element 20c shows a processor used in a node and the determination of a loss of packets occurs as seen in figure 7, element 128) and, in response to said loss of packets, to calculate a loss rate statistic (figure 3, element 20c shows a processor used in calculating a loss rate statistic, or the loss metric discussed in col. 10, lines 10-14);

a transmitter to transmit an outgoing loss report message through said first port in an upstream direction, said outgoing loss report message containing a field having said loss rate statistic written therein (figure 3, element 20d works as a transmitter and receiver to send and receive data from the network, further the child nodes of figure 1 send the loss statistic data to the parent node upstream, support for this is read in col. 9, lines 29-32)."

Regarding claim 34, Wesley discloses "the router of claim 33, further comprising: a receiver to receive an incoming loss report message on said second port said loss report traveling in said upstream direction (figure 3 shows a generic node of figure 1 where the network interface 20d receives/transmits data, the loss report message, the value of the retransmission count, is transmitted in the upstream direction with the packet as read in col. 8, lines 42-45 to the node, which is then used to update the RX-

RPC); and said processor to calculate said loss rate statistic in response to said loss of packets and in response to said loss report (figure 3, element 20c shows a processor used in calculating a loss rate statistic, or the loss metric discussed in col. 10, lines 10-14)."

Regarding claim 36, Wesley discloses "the router of claim 33, further comprising: said loss rate statistic is a time averaged loss rate (col. 10, lines 10-14 where "the measurement interval" indicates that the loss rate statistic is a time averaged loss rate of a number of missing packets during that interval)."

Regarding claim 38, Wesley discloses "the router of claim 33, further comprising: a central processor (CPU) forwarding engine, said CPU forwarding engine determining which port said outgoing loss report message is to be transmitted (figure 3, element 20a where the CPU controls the transmission of the router and thusly the port which data is transmitted out)."

Regarding claim 39, Wesley discloses "a central processor (CPU) control engine, said CPU control engine generating said loss report message (figure 3, element 20a where the CPU receives the respective information from the memory devices of 20b and assembles them into an outgoing packet, including a loss report message)."

Regarding claim 40, Wesley discloses "said outgoing loss report message is carried in a NAK packet (col. 5, lines 1-3 where the repair head is the sender node and as described in claim 1 the loss metric is sent by way of a message, such as the NACK described in col. 5, to the sender node so that it may control the flow of messages to the receiving nodes)."

Regarding claim 41, Wesley discloses "said outgoing loss report message is transmitted by said router in response to the router receiving a loss report message from a down stream router (col. 5, lines 1-3 in conjunction with figure 1, where it is strongly implied that if a receiver node 14 g for instance, sends a NACK message it is destined for the source node 12, the only path to that node is through other receiving nodes, therefore the loss report message, or NACK message, must be sent through other routing nodes to get to the source node)."

Regarding claim 42, Wesley discloses "said loss report message is periodically transmitted by said router (col. 5, lines 10-14 where "staggering" is periodically transmitting the message)."

Regarding claim 43, Wesley discloses "said outgoing loss report message is received at a source station of a multicast distribution tree (col. 5, lines 1-3 and figure 1, where figure 1 is a multicast distribution tree and the repair head is the source node 12), said source station controlling a transmission rate of data packets transmitted in said

multicast distribution tree based on the value of said loss rate statistic stored in said outgoing loss report message (col. 9, lines 45-54 where the slowness metric is the same as the loss rate statistic which is sent to the source node to determine transmission rate)."

Regarding claim 44, Wesley discloses "means for receiving said outgoing loss report message is received at a source station of a multicast distribution tree (col. 5, lines 1-3 and figure 1, where figure 1 is a multicast distribution tree and the repair head is the source node 12), means for controlling, in response to receiving said outgoing loss report message, a transmission rate of data packets transmitted by said source station in said multicast distribution tree based on the value of said loss rate statistic stored in said outgoing loss report message (col. 9, lines 45-54 where the slowness metric is the same as the loss rate statistic which is sent to the source node to determine transmission rate)."

Regarding claim 46, Wesley discloses "said outgoing loss report message stores a lifetime associated with said loss rate statistic, said lifetime indicating a duration of time for which said loss rate statistic is valid (col. 9, lines 10-19 where the effect of recalculating the loss metric at predetermined intervals is the same as giving a lifetime to the loss report message; by recalculating the loss metric at predetermined intervals the previous loss metric, which was sent in the previous loss report message, is good

only until the current interval reaches its end, once this happens the previous loss metric is no longer valid and the newly calculated metric's lifetime begins)."

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1, 4-27, 30, 31, 35, 37, 47, 48-58, 60-72, and 74-78 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wesley et al. (U.S. Patent 6,693,907 B1).

Regarding claim 1, Wesley discloses "a router controlling congestion on links attached to the router, said router comprising:

a plurality of ports (figure 1, node 14b for example has a plurality of ports as indicated by the input/output paths to the node);

a first port of said plurality of ports for receiving a data packet (figure 1, node 14b shows a first port entering node 14b from node 14d for example);

a second port of said plurality of ports for transmitting said data packet (figure 1, node 14b shows a second port connected to node 12);

a receiver to receive an incoming loss report message on said second port (figure 3 shows a generic node of figure 1 where the network interface 20d receives/transmits data, the loss report message, the value of the retransmission count,

is transmitted with the packet as read in col. 8, lines 42-45 to the node, which is then used to update the RX-RPC);

a...processor to determine loss of packets on selected ports of said plurality of ports (figure 3, element 20c shows a processor used in a node and the determination of a loss of packets occurs as seen in figure 7, element 128);

a...processor to calculate, in response to said incoming loss report message and said loss of packets, a loss rate statistic (figure 3, element 20c shows a processor used in calculating a loss rate statistic, or the loss metric discussed in col. 10, lines 10-14);

a transmitter to transmit an outgoing loss report message through said first port, said outgoing loss report message containing a field having said loss rate statistic written therein (figure 3, element 20d works as a transmitter and receiver to send and receive data from the network, further it is strongly suggested the child nodes of figure 1 send the loss statistic data to the parent node of figure 1, see col. 9, lines 29-32)."

However, Wesley explicitly lacks that there are two processors, "a first processor" and "a second processor" to execute the determining of a lost packets and the calculating of a loss statistic respectively. Although there is no mention of two processors, there is mention of a single processor. To break up a single processor into two different processors is a matter of design choice as not only indicated by applicant's originally presented claims 2 and 3, but also by the fact that the same results are generated by the single processor of Wesley that the two processors in the claim would accomplish.

It would have been obvious to one with ordinary skill in the art at the time of invention to include two processors for two different tasks as a matter of design choice. The motivation for having two processors over one might be to have two tasks executed at the same time, one by each processor, provided one task doesn't rely on the results of the other.

Regarding claims 4, 35, and 63, Wesley discloses the routers of claims 1, 33, and 61. However, Wesley does note explicitly state that "said loss rate statistic is a largest loss rate in a set of loss rates determined for said selected ports of said plurality of ports." Although Wesley does not choose the "largest" loss rate statistic, it would have been obvious to one with ordinary skill in the art to choose the largest statistic as a matter of design choice. Wesley describes the final loss rate statistic as an average, claim 4 describes as the largest of a group. Both instances of determining the loss rate statistic are merely different manipulations of the same received data. All the loss rate statistics for the ports are received and used by the system to determine a final loss rate that is sent to the sender node to monitor transmission rates. The motivation for whether the data are used to calculate a time averaged statistic or simply chosen as the largest loss rate statistic is a matter of designer and system preference. One holds no advantage over the other. They both achieve the same result of data rate monitoring and adjusting based on system performance.

Regarding claim 5, Wesley discloses "a router controlling congestion on links attached to the router, said router comprising:

a plurality of ports (figure 1, node 14b for example has a plurality of ports as indicated by the input/output paths to the node);

a first port of said plurality of ports for receiving a data packet (figure 1, node 14b shows a first port entering node 14b from node 14d for example);

a second port of said plurality of ports for transmitting said data packet (figure 1, node 14b shows a second port connected to node 12);

a receiver to receive an incoming loss report message on said second port (figure 3 shows a generic node of figure 1 where the network interface 20d receives/transmits data, the loss report message, the value of the retransmission count, is transmitted with the packet as read in col. 8, lines 42-45 to the node, which is then used to update the RX-RPC);

a...processor to determine loss of packets on selected ports of said plurality of ports (figure 3, element 20c shows a processor used in a node and the determination of a loss of packets occurs as seen in figure 7, element 128);

a...processor to calculate, in response to said incoming loss report message and said loss of packets, a loss rate statistic (figure 3, element 20c shows a processor used in calculating a loss rate statistic, or the loss metric discussed in col. 10, lines 10-14);

a transmitter to transmit an outgoing loss report message through said first port, said outgoing loss report message containing a field having said loss rate statistic written therein (figure 3, element 20d works as a transmitter and receiver to send and

receive data from the network, further it is strongly suggested the child nodes of figure 1 send the loss statistic data to the parent node of figure 1, see col. 9, lines 29-32),

wherein said loss rate statistic is a time averaged loss rate (col. 10, lines 10-14 where "the measurement interval" indicates that the loss rate statistic is a time averaged loss rate of a number of missing packets during that interval)."

However, Wesley explicitly lacks that there are two processors, "a first processor" and "a second processor" to execute the determining of a lost packets and the calculating of a loss statistic respectively. Although there is no mention of two processors, there is mention of a single processor. To break up a single processor into two different processors is a matter of design choice as not only indicated by applicant's originally presented claims 2 and 3, but also by the fact that the same results are generated by the single processor of Wesley that the two processors in the claim would accomplish.

It would have been obvious to one with ordinary skill in the art at the time of invention to include two processors for two different tasks as a matter of design choice. The motivation for having two processors over one might be to have two tasks executed at the same time, one by each processor, provided one task doesn't rely on the results of the other.

Regarding claim 6, Wesley discloses the router of claim 1. Although Wesley lacks the first and second processor of claim 1, Wesley further discloses "a linecard supporting at least one of said plurality of ports, said linecard having a linecard

processor and a memory mounted thereon, said linecard processor a computing said loss of packets (figure 3 shows a device that is the functional equivalent of a linecard in that it receives and transmits data to and from the node and the network, further the device has a memory 20b and a processor 20a)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the linecard with processor and memory with the router of claim 1 for the same reasons and motivation as in claim 1.

Regarding claim 7, Wesley discloses the router of claim 1. Although Wesley lacks the first and second processor of claim 1, Wesley further discloses "said outgoing loss report message is carried in a NAK packet (col. 5, lines 1-3 where the repair head is the sender node and as described in claim 1 the loss metric is sent by way of a message, such as the NACK described in col. 5, to the sender node so that it may control the flow of messages to the receiving nodes)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the loss report in the NAK packet for the same reasons and motivation as in claim 1.

Regarding claim 8, Although Wesley lacks the first and second processor of claim 1, Wesley further discloses "said outgoing loss report message is transmitted by said router in response to the router receiving a loss report message from a down stream router (col. 5, lines 1-3 in conjunction with figure 1, where it is strongly implied that if a receiver node 14 g for instance, sends a NACK message it is destined for the

source node 12, the only path to that node is through other receiving nodes, therefore the loss report message, or NACK message, must be sent through other routing nodes to get to the source node)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the loss report message being transmitted by a router in response to receiving a loss report message with the router of claim 1 for the same reasons and motivation as in claim 1.

Regarding claim 9, Although Wesley lacks the first and second processor of claim 1, Wesley further discloses "said loss report message is transmitted by said router in response to the router receiving a loss report message from a target receiver station (col. 5, lines 1-3 in conjunction with figure 1, where it is strongly implied that if a target receiver node 14 g for instance, sends a NACK message it is destined for the source node 12, the only path to that node is through other receiving nodes, therefore the loss report message, or NACK message, must be sent through other routing nodes to get to the source node)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the loss report message being transmitted by a router in response to receiving a loss report message with the router of claim 1 for the same reasons and motivation as in claim 1.

Regarding claim 10, Although Wesley lacks the first and second processor of claim 1, Wesley further discloses "said loss report message is periodically transmitted by said router (col. 5, lines 10-14 where "staggering" is periodically transmitting the

message)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the periodic loss report transmitting with the router of claim 1 for the same reasons and motivation as in claim 1.

Regarding claim 11, Although Wesley lacks the first and second processor of claim 1, Wesley further discloses "a central processor (CPU) forwarding engine, said CPU forwarding engine determining which port said loss report message is to be transmitted out through (figure 3, element 20a where, as is known in the art, the CPU controls the transmission of the router and thusly the port which data is transmitted out)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the forwarding engine with the router of claim 1 for the same reasons and motivation as in claim 1.

Regarding claim 12, Although Wesley lacks the first and second processor of claim 1, Wesley further discloses "a central processor (CPU) control engine, said CPU control engine generating said loss report message (figure 3, element 20a where, as is known in the art, the CPU receives the respective information from the memory devices of 20b and assembles them into an outgoing packet, including a loss report message)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the control engine generating said loss report message with the router of claim 1 for the same reasons and motivation as in claim 1.

Regarding claim 26, Wesley discloses the router of claim 1. Although Wesley lacks the first and second processor of claim 1, Wesley further discloses "said outgoing loss report message is received at a source station of a multicast distribution tree (col. 5, lines 1-3 and figure 1, where figure 1 is a multicast distribution tree and the repair head is the source node 12), said source station controlling a transmission rate of data packets transmitted in said multicast distribution tree based on the value of said loss rate statistic stored in said outgoing loss report message (col. 9, lines 45-54 where the slowness metric is the same as the loss rate statistic which is sent to the source node to determine transmission rate)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the source station of a multicast distribution tree with the router of claim 1 for the same reasons and motivation as in claim 1.

Regarding claim 30, Wesley discloses the router of claim 1. Although Wesley lacks the first and second processor of claim 1, Wesley further discloses "said outgoing loss report message stores a lifetime associated with said loss rate statistic, said lifetime indicating a duration of time for which said loss rate statistic is valid (col. 9, lines 10-19 where the effect of recalculating the loss metric at predetermined intervals is the same as giving a lifetime to the loss report message; by recalculating the loss metric at predetermined intervals the previous loss metric, which was sent in the previous loss report message, is good only until the current interval reaches its end, once this happens the previous loss metric is no longer valid and the newly calculated metric's lifetime begins)." It would have been obvious to one with ordinary skill in the art at the

time of invention to include the lifetime of the loss metric with the router of claim 1 for the same reasons and motivation as in claim 1.

Regarding claim 13, Wesley discloses “a method for operating a router, comprising:

receiving a multicast group data packet at a first port (col. 8, lines 14-15)...

receiving an incoming loss report message on said second port (col. 5, lines 1-8 where the loss report message, NACK message, is sent from the receiver nodes of figure 1 to the sender node, the receiver nodes lower in the tree must send these NACK messages through other nodes, thus a receiver node is capable of receiving a NACK message on a second port en route to the sender node);

computing a loss of packets on selected ports of said router (col. 8, lines 66-col. 9, lines 1-3);

calculating, in response to said incoming loss report message and said loss of packets, a loss rate statistic (col. 10, lines 11-15 where the experienced loss is the loss metric of col. 9);

transmitting an outgoing loss report message through said first port, said outgoing loss report message containing said loss rate statistic in a field of said outgoing loss report message (col. 9, lines 29-32 where the slowness metrics are again the loss metrics calculated by the receiving nodes and then sent to the sending node for further processing).”

However, Wesley explicitly lacks "transmitting a replica of said multicast group data packet from a second port..." Although Wesley does not explicitly discuss transmitting replica data packets from a second port, it is implied that this is the case as read in col. 8, lines 14-15 in conjunction with figure 1, the messages destined for node 14g from the sending node for instance, must be replicated at each receiver node on the path from the sending node to node 14g.

It would have been obvious to one with ordinary skill in the art at the time of invention to have the data packets replicated at the receiver node for the purpose of each node in a path keeping track of lost or missing packets. The motivation for keeping track of lost or missing packets is so that the multicast tree can provide reliability support in the form of transmission rate control so that congestion can be avoided or dealt (Wesley, col. 1, lines 34-41).

Regarding claims 14 and 49, Wesley discloses the methods of claims 13 and 47. However, Wesley does note explicitly state that "...said loss rate statistic as a largest packet loss rate in a set of loss rates computed for said selected ports of said plurality of ports." Although Wesley does not choose the "largest" loss rate statistic, it would have been obvious to one with ordinary skill in the art to choose the largest statistic as a matter of design choice. Wesley describes the final loss rate statistic as an average, claim 4 describes as the largest of a group. Both instances of determining the loss rate statistic are merely different manipulations of the same received data. All the loss rate statistics for the ports are received and used by the system to determine a final loss rate

that is sent to the sender node to monitor transmission rates. The motivation for whether the data are used to calculate a time averaged statistic or simply chosen as the largest loss rate statistic is a matter of designer and system preference. One holds no advantage over the other. They both achieve the same result of data rate monitoring and adjusting based on system performance.

Regarding claim 15, Wesley discloses "a method for operating a router, comprising:

receiving a multicast group data packet at a first port (col. 8, lines 14-15)...

receiving an incoming loss report message on said second port (col. 5, lines 1-8 where the loss report message, NACK message, is sent from the receiver nodes of figure 1 to the sender node, the receiver nodes lower in the tree must send these NACK messages through other nodes, thus a receiver node is capable of receiving a NACK message on a second port en route to the sender node);

computing a loss of packets on selected ports of said router (col. 8, lines 66-col. 9, lines 1-3);

calculating, in response to said incoming loss report message and said loss of packets, a loss rate statistic (col. 10, lines 11-15 where the experienced loss is the loss metric of col. 9);

transmitting an outgoing loss report message through said first port, said outgoing loss report message containing said loss rate statistic in a field of said outgoing loss report message (col. 9, lines 29-32 where the slowness metrics are again

the loss metrics calculated by the receiving nodes and then sent to the sending node for further processing); and

choosing said loss rate statistic as a time averaged packet loss rate as determined by said router (col. 10, lines 10-14 where "the measurement interval" indicates that the loss rate statistic is a time averaged loss rate of a number of missing packets during that interval)."

However, Wesley explicitly lacks "transmitting a replica of said multicast group data packet from a second port..." Although Wesley does not explicitly discuss transmitting replica data packets from a second port, it is implied that this is the case as read in col. 8, lines 14-15 in conjunction with figure 1, the messages destined for node 14g from the sending node for instance, must be replicated at each receiver node on the path from the sending node to node 14g.

It would have been obvious to one with ordinary skill in the art at the time of invention to have the data packets replicated at the receiver node for the purpose of each node in a path keeping track of lost or missing packets. The motivation for keeping track of lost or missing packets is so that the multicast tree can provide reliability support in the form of transmission rate control so that congestion can be avoided or dealt (Wesley, col. 1, lines 34-41).

Regarding claim 16, Wesley discloses the method of claim 13. Although Wesley does not explicitly disclose the replicating of data for downstream receivers, Wesley further discloses "selecting said selected ports as members of a multicast group

distribution tree (figure 1 where all the nodes and their ports are part of a multicast group distribution tree)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the multicast distribution tree for the same reasons and motivation as in claim 13.

Regarding claim 17, Wesley discloses the method of claim 13. Although Wesley does not explicitly disclose the replicating of data for downstream receivers, Wesley further discloses "determining a loss rate statistic which has not expired for at least one port of said router, where said at least one port includes all ports of a multicast group distribution tree of said multicast group (col. 9, lines 10-19 where the effect of recalculating the loss metric at predetermined intervals is the same as having the previous loss metric expire when the new loss metric is calculated; while the packets of the interval are arriving, the current loss metric is valid and thus the loss metric is determined for the given port of the distribution tree of figure 1); writing said loss rate statistic into said outgoing loss report message before transmitting said outgoing loss report message (col. 9, lines 29-32 where the slowness metrics are the loss metrics calculated by the receiving nodes and then sent to the sending node as outgoing loss report messages)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the non-expired loss rate statistic in an outgoing message for the same reasons and motivation as in claim 13.

Regarding claim 18, Wesley discloses the method of claim 13. Although Wesley does not explicitly disclose the replicating of data for downstream receivers, Wesley further discloses "said loss report is carried in a NAK message (col. 5, lines 1-3 where the repair head is the sender node and as described in claim 1 the loss metric is sent by way of a message, such as the NACK described in col. 5, to the sender node so that it may control the flow of messages to the receiving nodes)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the loss report in the NAK packet for the same reasons and motivation as in claim 13.

Regarding claim 19, Wesley discloses the method of claim 13. Although Wesley does not explicitly disclose the replicating of data for downstream receivers, Wesley further discloses "transmitting said outgoing loss report message in response to receiving said incoming loss report message (figure 1 in conjunction with col. 9, lines 29-32 where it is suggested that if a node 14g for instance, transmits a loss report message that is destined for the sending node 12, then this message must be sent through the tree to the sending node and thus each receiving node that receives the incoming loss report message will then generate an outgoing loss report message for the sending node)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the loss report message being transmitted by a router in response to receiving a loss report message with the method of claim 13 for the same reasons and motivation as in claim 13.

Regarding claim 20, Wesley discloses the method of claim 13. Although Wesley does not explicitly disclose the replicating of data for downstream receivers, Wesley further discloses "transmitting said outgoing loss report packet periodically (col. 5, lines 10-14 where "staggering" is periodically transmitting the message)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the periodic loss report transmitting with the method of claim 13 for the same reasons and motivation as in claim 13.

Regarding claim 21, Wesley discloses the method of claim 13. Although Wesley does not explicitly disclose the replicating of data for downstream receivers, Wesley further discloses "transmitting said outgoing loss report message as a unicast message to the next upstream router capable of responding to said loss report message (col. 9, lines 29-32 where it is implied that the slowness metric contained in the loss report message is only destined for the sending node, thusly the message is a unicast message because it is only destined for one node, the sending node)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the unicast loss report with the method of claim 13 for the same reasons and motivation as in claim 13.

Regarding claim 22, Wesley discloses the method of claim 13. However, Wesley lacks "transmitting said outgoing loss report message as a multicast message." Although Wesley does not state the loss report message is multicast, it would have

been obvious to one with ordinary skill in the art at the time of invention to have the loss report message transmitted as multicast instead of unicast as a matter of design choice. The reason being that the intended recipients of a message are chosen during formation of the data packet, since the intended recipients of a message depend on network structure and the network's ability to forward messages to other nodes, the message will thusly be sent according to network design and structure. The motivation for sending data multicast versus unicast is a matter of system design and function.

Regarding claim 27, Wesley discloses the method of claim 13. Although Wesley does not explicitly disclose the replicating of data for downstream receivers, Wesley further discloses "receiving said outgoing loss report message at a source station of a multicast distribution tree (col. 9, lines 29-32 where the slowness metric is the loss statistic that is included in a loss report message); and controlling, in response to receiving said outgoing loss report message, a transmission rate of data packets transmitted by said source station in said multicast distribution tree based on the value of said loss rate statistic stored in said outgoing loss report message (col. 9, lines 33-54)." It would have been obvious to one with ordinary skill in the art to send the loss report message to the sending node and have the sending node control transmission rates based on the loss report message for the same reasons and motivation as in claim 13.

Regarding claim 31, Wesley discloses the method of claim 13. Although Wesley does not explicitly disclose the replicating of data for downstream receivers, Wesley further discloses "associating with said loss rate statistic a lifetime for aging said loss rates statistic (col. 9, lines 10-19 where the effect of recalculating the loss metric at predetermined intervals is the same as giving a lifetime to the loss report message); determining whether said loss rate statistic is valid based on the value of said lifetime associated with said loss rate statistic (col. 9, lines 10-19 while the current interval is still receiving its allotted number of packets the loss rate statistic most recently calculated is valid); and writing, in response to determining that said loss rate statistic is valid, said loss rate statistic into said outgoing loss report message before transmitting said outgoing loss report message (col. 9, lines 10-19 since the current interval has not ended, the current loss rate statistic is valid and put in a message and sent to the sending node as described in col. 9, lines 29-32)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the lifetime of the loss metric with the method of claim 13 for the same reasons and motivation as in claim 13.

Regarding claim 24, Wesley discloses the method of claim 13. Although Wesley does not explicitly disclose the replicating of data for downstream receivers, Wesley further discloses "a computer readable media having instructions written thereon for practicing the method of claim 13 (col. 11, lines 6-28)." It would have been obvious however, to one with ordinary skill in the art at the time of invention to include the computer readable media with instructions for performing the method of claim 13

because this is the only feasible way to implement the method. The motivation for using a computer readable medium with a computer program is so that the method is executed by a fast and efficient means, and computer instructions are the only way to do this for electronic data.

Regarding claim 25, Wesley discloses the method of claim 13. Although Wesley does not explicitly disclose the replicating of data for downstream receivers, Wesley further discloses "electromagnetic signals carried on a computer network, said electromagnetic signals carrying instructions for practicing the method of claim 13 (col. 11, lines 6-28)." It would have been obvious however, to one with ordinary skill in the art at the time of invention to include the electromagnetic signals for performing the method of claim 13 because this is the only feasible way to carrying the instructions for implementing the method. The motivation for using electromagnetic signals is so that the method is executed by a fast and efficient means, and electromagnetic signals carried on a computer network are the only way to do this for data made of electronic signals.

In regard to claim 23, Chen ('674) discloses "a router, comprising:

means for receiving a multicast group data packet at a first port (col. 8, lines 14-15);

means for receiving an incoming loss report message on said second port (col. 5, lines 1-8 where the loss report message, NACK message, is sent from the receiver

nodes of figure 1 to the sender node, the receiver nodes lower in the tree must send these NACK messages through other nodes, thus a receiver node is capable of receiving a NACK message on a second port en route to the sender node);

means for computing a loss of packets on selected ports of said router (col. 8, lines 66-col. 9, lines 1-3);

means for calculating, in response to said incoming loss report message and said loss of packets, a loss rate statistic (col. 10, lines 11-15 where the experienced loss is the loss metric of col. 9);

means for transmitting an outgoing loss report message through said first port, said outgoing loss report message containing said loss rate statistic in a field of said outgoing loss report message (col. 9, lines 29-32 where the slowness metrics are again the loss metrics calculated by the receiving nodes and then sent to the sending node for further processing)."

However, Wesley explicitly lacks "means for transmitting a replica of said multicast group data packet from a second port..." Although Wesley does not explicitly discuss transmitting replica data packets from a second port, it is implied that this is the case as read in col. 8, lines 14-15 in conjunction with figure 1, the messages destined for node 14g from the sending node for instance, must be replicated at each receiver node on the path from the sending node to node 14g.

It would have been obvious to one with ordinary skill in the art at the time of invention to have the data packets replicated at the receiver node for the purpose of each node in a path keeping track of lost or missing packets. The motivation for keeping

track of lost or missing packets is so that the multicast tree can provide reliability support in the form of transmission rate control so that congestion can be avoided or dealt (Wesley, col. 1, lines 34-41).

Regarding claim 37, Wesley discloses the router of claim 33. However, Wesley explicitly lacks "a linecard supporting at least one of said plurality of ports, said linecard having a linecard processor and a memory mounted thereon, said linecard processor a computing said loss of packets (figure 3 shows a device that is the functional equivalent of a linecard in that it receives and transmits data to and from the node and the network, further the device has a memory 20b and a processor 20a)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the functional equivalent to the linecard for the purpose of receiving and transmitting data at each network node for processing and network maintenance. The motivation for receiving data at each network node and processing the data for network maintenance is so that if network congestion occurs, the proper steps can be taken to remedy the situation so communication is not hindered on the network.

Regarding claim 47, Wesley discloses "a method for operating a router, comprising:

receiving a data packet traveling in a downstream direction at a first port (col. 8, lines 14-15 where the packet is traveling in a downstream direction as defined in col. 1, lines 28-33)...

computing a loss of packets on selected ports of said router (col. 8, lines 66-col. 9, lines 1-3);

calculating, in response to said incoming loss report message and said loss of packets, a loss rate statistic (col. 10, lines 11-15 where the experienced loss is the loss metric of col. 9);

transmitting an outgoing loss report message through said first port in an upstream direction, said outgoing loss report message containing said loss rate statistic in a field of said outgoing loss report message (col. 9, lines 29-32 where the slowness metrics are again the loss metrics calculated by the receiving nodes and then sent to the sending node, which is upstream, for further processing)."

However, Wesley explicitly lacks "transmitting a replica of said data packet from a second port in said downstream direction..." Although Wesley does not explicitly discuss transmitting replica data packets from a second port, it is implied that this is the case as read in col. 8, lines 14-15 in conjunction with figure 1, the messages destined for node 14g from the sending node for instance, must be replicated at each receiver node on the path from the sending node to node 14g.

It would have been obvious to one with ordinary skill in the art at the time of invention to have the data packets replicated at the receiver node for the purpose of each node in a path keeping track of lost or missing packets. The motivation for keeping track of lost or missing packets is so that the multicast tree can provide reliability support in the form of transmission rate control so that congestion can be avoided or dealt (Wesley, col. 1, lines 34-41).

Regarding claim 48, Wesley discloses the method of claim 47. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "receiving an incoming loss report message on said second port, said loss report traveling in said upstream direction (col. 5, lines 1-8 where the loss report message, NACK message, is sent from the receiver nodes of figure 1 to the sender node, the receiver nodes lower in the tree must send these NACK messages through other nodes, thus a receiver node is capable of receiving a NACK message on a second port en route to the sender node); and calculating said loss rate statistic in response to said loss of packets and in response to said loss report (figure 3, element 20c shows a processor used in calculating a loss rate statistic, or the loss metric discussed in col. 10, lines 10-14)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the receiving of the incoming loss report message in the upstream direction and the calculating of the loss rate statistic for the same reasons and motivation as in claim 47.

Regarding claim 50, Wesley discloses the method of claim 47. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "calculating said loss rate statistic as a time averaged loss rate (col. 10, lines 10-14 where "the measurement interval" indicates that the loss rate statistic is a time averaged loss rate of a number of missing packets during that interval)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the calculating of the loss

rate statistic as a time averaged loss rate statistic for the same reasons and motivation as in claim 47.

Regarding claim 51, Wesley discloses the method of claim 47. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "computing said loss of packets by a processor mounted on a linecard, said linecard supporting at least one of said plurality of ports, said linecard having said linecard processor and a memory mounted thereon (figure 3 shows a device that is the functional equivalent of a linecard in that it receives and transmits data to and from the node and the network, further the device has a memory 20b and a processor 20a)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the linecard for the same reasons and motivation as in claim 47.

Regarding claim 52, Wesley discloses the method of claim 47. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "determining which port said outgoing loss report message is to be transmitted by a central processor (CPU) forwarding engine (figure 3, element 20a where, as is known in the art, the CPU controls the transmission of the router and thusly the port which data is transmitted out)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the forwarding engine with the method of claim 47 for the same reasons and motivation as in claim 47.

Regarding claim 53, Wesley discloses the method of claim 47. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "generating said outgoing loss report message by a central processor (CPU) control engine (figure 3, element 20a where, as is known in the art, the CPU receives the respective information from the memory devices of 20b and assembles them into an outgoing packet, including a loss report message)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the control engine generating said loss report message with the method of claim 47 for the same reasons and motivation as in claim 47.

Regarding claim 54, Wesley discloses the method of claim 47. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "carrying said outgoing loss report message is carried in a NAK packet (col. 5, lines 1-3 where the repair head is the sender node and as described in claim 1 the loss metric is sent by way of a message, such as the NACK described in col. 5, to the sender node so that it may control the flow of messages to the receiving nodes)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the NAK message with the method of claim 47 for the same reasons and motivation as in claim 47.

Regarding claim 55, Wesley discloses the method of claim 47. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "transmitting said outgoing loss report message by said router in response to the router receiving a

loss report message from a down stream router (col. 5, lines 1-3 in conjunction with figure 1, where it is strongly implied that if a receiver node 14 g for instance, sends a NACK message it is destined for the source node 12, the only path to that node is through other receiving nodes, therefore the loss report message, or NACK message, must be sent through other routing nodes to get to the source node)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the downstream router with the method of claim 47 for the same reasons and motivation as in claim 47.

Regarding claim 56, Wesley discloses the method of claim 47. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "transmitting said loss report message is periodically transmitted by said router (col. 5, lines 10-14 where "staggering" is periodically transmitting the message)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the periodically sending the loss report message with the method of claim 47 for the same reasons and motivation as in claim 47.

Regarding claim 57, Wesley discloses the method of claim 47. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "transmitting said outgoing loss report message upstream so that it can be received at a source station of a multicast distribution tree (col. 5, lines 1-3 and figure 1, where figure 1 is a multicast distribution tree and the repair head is the source node 12), said source

station controlling a transmission rate of data packets transmitted in said multicast distribution tree based on the value of said loss rate statistic stored in said outgoing loss report message (col. 9, lines 45-54 where the slowness metric is the same as the loss rate statistic which is sent to the source node to determine transmission rate)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the multicast distribution tree with the method of claim 47 for the same reasons and motivation as in claim 47.

Regarding claim 58, Wesley discloses the method of claim 47. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "receiving said outgoing loss report message is received at a source station of a multicast distribution tree (col. 5, lines 1-3 and figure 1, where figure 1 is a multicast distribution tree and the repair head is the source node 12), controlling, in response to receiving said outgoing loss report message, a transmission rate of data packets transmitted by said source station in said multicast distribution tree based on the value of said loss rate statistic stored in said outgoing loss report message (col. 9, lines 45-54 where the slowness metric is the same as the loss rate statistic which is sent to the source node to determine transmission rate)." It would have been obvious to one with ordinary skill in the art at the time of invention to include receiving at the multicast distribution tree with the method of claim 47 for the same reasons and motivation as in claim 47.

Regarding claim 60, Wesley discloses the method of claim 47. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "associating with said loss rate statistic a lifetime for aging said loss rates statistic (col. 9, lines 10-19 where the effect of recalculating the loss metric at predetermined intervals is the same as giving a lifetime to the loss report message); determining whether said loss rate statistic is valid based on the value of said lifetime associated with said loss rate statistic (col. 9, lines 10-19 while the current interval is still receiving its allotted number of packets the loss rate statistic most recently calculated is valid); and writing, in response to determining that said loss rate statistic is valid, said loss rate statistic into said outgoing loss report message before transmitting said outgoing loss report message (col. 9, lines 10-19 since the current interval has not ended, the current loss rate statistic is valid and put in a message and sent to the sending node as described in col. 9, lines 29-32)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the lifetime of the loss metric with the method of claim 47 for the same reasons and motivation as in claim 47.

Regarding claim 61, Wesley discloses "a router, comprising:

means for receiving a data packet traveling in a downstream direction at a first port (col. 8, lines 14-15 where the packet is traveling in a downstream direction as defined in col. 1, lines 28-33)...

means for computing a loss of packets on selected ports of said router (col. 8, lines 66-col. 9, lines 1-3);

means for calculating, in response to said incoming loss report message and said loss of packets, a loss rate statistic (col. 10, lines 11-15 where the experienced loss is the loss metric of col. 9);

means for transmitting an outgoing loss report message through said first port in an upstream direction, said outgoing loss report message containing said loss rate statistic in a field of said outgoing loss report message (col. 9, lines 29-32 where the slowness metrics are again the loss metrics calculated by the receiving nodes and then sent to the sending node, which is upstream, for further processing)."

However, Wesley explicitly lacks "means for transmitting a replica of said data packet from a second port in said downstream direction..." Although Wesley does not explicitly discuss transmitting replica data packets from a second port, it is implied that this is the case as read in col. 8, lines 14-15 in conjunction with figure 1, the messages destined for node 14g from the sending node for instance, must be replicated at each receiver node on the path from the sending node to node 14g.

It would have been obvious to one with ordinary skill in the art at the time of invention to have the data packets replicated at the receiver node for the purpose of each node in a path keeping track of lost or missing packets. The motivation for keeping track of lost or missing packets is so that the multicast tree can provide reliability support in the form of transmission rate control so that congestion can be avoided or dealt (Wesley, col. 1, lines 34-41).

Regarding claim 62, Wesley discloses the router of claim 61. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "means for receiving an incoming loss report message on said second port, said loss report traveling in said upstream direction (col. 5, lines 1-8 where the loss report message, NACK message, is sent from the receiver nodes of figure 1 to the sender node, the receiver nodes lower in the tree must send these NACK messages through other nodes, thus a receiver node is capable of receiving a NACK message on a second port en route to the sender node); and means for calculating said loss rate statistic in response to said loss of packets and in response to said loss report (figure 3, element 20c shows a processor used in calculating a loss rate statistic, or the loss metric discussed in col. 10, lines 10-14)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the receiving of the incoming loss report message in the upstream direction and the calculating of the loss rate statistic for the same reasons and motivation as in claim 61.

Regarding claim 64, Wesley discloses the router of claim 61. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "means for calculating said loss rate statistic as a time averaged loss rate (col. 10, lines 10-14 where "the measurement interval" indicates that the loss rate statistic is a time averaged loss rate of a number of missing packets during that interval)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the

calculating of the loss rate statistic as a time averaged loss rate statistic for the same reasons and motivation as in claim 61.

Regarding claim 65, Wesley discloses the router of claim 61. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "means for computing said loss of packets by a processor mounted on a linecard, said linecard supporting at least one of said plurality of ports, said linecard having said linecard processor and a memory mounted thereon (figure 3 shows a device that is the functional equivalent of a linecard in that it receives and transmits data to and from the node and the network, further the device has a memory 20b and a processor 20a)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the linecard for the same reasons and motivation as in claim 61.

Regarding claim 66, Wesley discloses the router of claim 61. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "means for determining which port said outgoing loss report message is to be transmitted by a central processor (CPU) forwarding engine (figure 3, element 20a where, as is known in the art, the CPU controls the transmission of the router and thusly the port which data is transmitted out)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the forwarding engine with the router of claim 61 for the same reasons and motivation as in claim 61.

Regarding claim 67, Wesley discloses the router of claim 61. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "means for generating said outgoing loss report message by a central processor (CPU) control engine (figure 3, element 20a where, as is known in the art, the CPU receives the respective information from the memory devices of 20b and assembles them into an outgoing packet, including a loss report message)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the control engine generating said loss report message with the router of claim 61 for the same reasons and motivation as in claim 61.

Regarding claim 68, Wesley discloses the router of claim 61. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "means for carrying said outgoing loss report message is carried in a NAK packet (col. 5, lines 1-3 where the repair head is the sender node and as described in claim 1 the loss metric is sent by way of a message, such as the NACK described in col. 5, to the sender node so that it may control the flow of messages to the receiving nodes)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the NAK message with the router of claim 61 for the same reasons and motivation as in claim 61.

Regarding claim 69, Wesley discloses the router of claim 61. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "means for transmitting said outgoing loss report message by said router in response to the router

receiving a loss report message from a down stream router (col. 5, lines 1-3 in conjunction with figure 1, where it is strongly implied that if a receiver node 14 g for instance, sends a NACK message it is destined for the source node 12, the only path to that node is through other receiving nodes, therefore the loss report message, or NACK message, must be sent through other routing nodes to get to the source node)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the downstream router with the router of claim 61 for the same reasons and motivation as in claim 61.

Regarding claim 70, Wesley discloses the router of claim 61. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "means for transmitting said loss report message is periodically transmitted by said router (col. 5, lines 10-14 where "staggering" is periodically transmitting the message)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the periodically sending the loss report message with the router of claim 61 for the same reasons and motivation as in claim 61.

Regarding claim 71, Wesley discloses the router of claim 61. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "means for transmitting said outgoing loss report message upstream so that it can be received at a source station of a multicast distribution tree (col. 5, lines 1-3 and figure 1, where figure 1 is a multicast distribution tree and the repair head is the source node 12), said source

station controlling a transmission rate of data packets transmitted in said multicast distribution tree based on the value of said loss rate statistic stored in said outgoing loss report message (col. 9, lines 45-54 where the slowness metric is the same as the loss rate statistic which is sent to the source node to determine transmission rate)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the multicast distribution tree with the router of claim 61 for the same reasons and motivation as in claim 61.

Regarding claim 72, Wesley discloses the router of claim 61. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "means for receiving said outgoing loss report message is received at a source station of a multicast distribution tree (col. 5, lines 1-3 and figure 1, where figure 1 is a multicast distribution tree and the repair head is the source node 12), means for controlling, in response to receiving said outgoing loss report message, a transmission rate of data packets transmitted by said source station in said multicast distribution tree based on the value of said loss rate statistic stored in said outgoing loss report message (col. 9, lines 45-54 where the slowness metric is the same as the loss rate statistic which is sent to the source node to determine transmission rate)." It would have been obvious to one with ordinary skill in the art at the time of invention to include receiving at the multicast distribution tree with the router of claim 61 for the same reasons and motivation as in claim 61.

Regarding claim 74, Wesley discloses the router of claim 61. Although Wesley lacks the transmitting of the replica data packet, Wesley further discloses "means for associating with said loss rate statistic a lifetime for aging said loss rates statistic (col. 9, lines 10-19 where the effect of recalculating the loss metric at predetermined intervals is the same as giving a lifetime to the loss report message); means for determining whether said loss rate statistic is valid based on the value of said lifetime associated with said loss rate statistic (col. 9, lines 10-19 while the current interval is still receiving its allotted number of packets the loss rate statistic most recently calculated is valid); and means for writing, in response to determining that said loss rate statistic is valid, said loss rate statistic into said outgoing loss report message before transmitting said outgoing loss report message (col. 9, lines 10-19 since the current interval has not ended, the current loss rate statistic is valid and put in a message and sent to the sending node as described in col. 9, lines 29-32)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the lifetime of the loss metric with the router of claim 61 for the same reasons and motivation as in claim 61.

Regarding claims 75 and 76, Wesley discloses "a computer readable media, comprising: said computer readable media having instructions written thereon for execution on a processor for the practice of a method of operating a router (col. 11, lines 6-28)..." and "electromagnetic signals propagating on a computer network, comprising: said electromagnetic signals carrying instructions for execution on a processor for the practice of a method of operating a router (col. 11, lines 6-28)..."

both methods "having the steps of,

receiving a multicast group data packet at a first port (col. 8, lines 14-15)...

receiving an incoming loss report message on said second port (col. 5, lines 1-8 where the loss report message, NACK message, is sent from the receiver nodes of figure 1 to the sender node, the receiver nodes lower in the tree must send these NACK messages through other nodes, thus a receiver node is capable of receiving a NACK message on a second port en route to the sender node);

computing a loss of packets on selected ports of said router (col. 8, lines 66-col. 9, lines 1-3);

calculating, in response to said incoming loss report message and said loss of packets, a loss rate statistic (col. 10, lines 11-15 where the experienced loss is the loss metric of col. 9);

transmitting an outgoing loss report message through said first port, said outgoing loss report message containing said loss rate statistic in a field of said outgoing loss report message (col. 9, lines 29-32 where the slowness metrics are again the loss metrics calculated by the receiving nodes and then sent to the sending node for further processing)."

However, Wesley explicitly lacks "transmitting a replica of said multicast group data packet from a second port..." Although Wesley does not explicitly discuss transmitting replica data packets from a second port, it is implied that this is the case as read in col. 8, lines 14-15 in conjunction with figure 1, the messages destined for node

14g from the sending node for instance, must be replicated at each receiver node on the path from the sending node to node 14g.

It would have been obvious to one with ordinary skill in the art at the time of invention to have the data packets replicated at the receiver node for the purpose of each node in a path keeping track of lost or missing packets. The motivation for keeping track of lost or missing packets is so that the multicast tree can provide reliability support in the form of transmission rate control so that congestion can be avoided or dealt (Wesley, col. 1, lines 34-41).

Regarding claims 77 and 78, Wesley discloses "a computer readable media, comprising: said computer readable media having instructions written thereon for execution on a processor for the practice of a method of operating a router (col. 11, lines 6-28)..." and "electromagnetic signals propagating on a computer network, comprising: said electromagnetic signals carrying instructions for execution on a processor for the practice of a method of operating a router (col. 11, lines 6-28)..."

both methods "having the steps of,

receiving a data packet traveling in a downstream direction at a first port (col. 8, lines 14-15 where the packet is traveling in a downstream direction as defined in col. 1, lines 28-33)...

computing a loss of packets on selected ports of said router (col. 8, lines 66-col. 9, lines 1-3);

calculating, in response to said incoming loss report message and said loss of packets, a loss rate statistic (col. 10, lines 11-15 where the experienced loss is the loss metric of col. 9);

transmitting an outgoing loss report message through said first port in an upstream direction, said outgoing loss report message containing said loss rate statistic in a field of said outgoing loss report message (col. 9, lines 29-32 where the slowness metrics are again the loss metrics calculated by the receiving nodes and then sent to the sending node, which is upstream, for further processing)."

However, Wesley explicitly lacks "transmitting a replica of said data packet from a second port in said downstream direction..." Although Wesley does not explicitly discuss transmitting replica data packets from a second port, it is implied that this is the case as read in col. 8, lines 14-15 in conjunction with figure 1, the messages destined for node 14g from the sending node for instance, must be replicated at each receiver node on the path from the sending node to node 14g.

It would have been obvious to one with ordinary skill in the art at the time of invention to have the data packets replicated at the receiver node for the purpose of each node in a path keeping track of lost or missing packets. The motivation for keeping track of lost or missing packets is so that the multicast tree can provide reliability support in the form of transmission rate control so that congestion can be avoided or dealt (Wesley, col. 1, lines 34-41).

Claims 28, 29, 45, 59, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wesley et al. in view of Machida et al. (U.S. Patent 5,715,177).

Regarding claims 28 and 45, Wesley discloses the routers of claims 1 and 33. However, Wesley lacks what Machida discloses, "said outgoing loss report message is not transmitted by said transmitter if an absolute value of a fractional change of said loss rate statistic, as compared with a previous loss rate statistic, is less than or equal to a predetermined limit value (col. 2, lines 36-48, although Machida does not explicitly talk about a loss report message Wesley discloses the loss report message, this combined with the concept from Machida is what is being used for claim 28; further the fractional change in data is simply the difference between the currently received data and the previous data, any number (including a difference) can be represented in a fractional way, what is important in Machida is the use of the difference to determine whether or not to send a message if that difference is smaller than a predetermined limit value)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the predetermined limit value and comparison of data for the purpose of not having the system become overburdened with messages in response to differences in data even if the differences are minute. The motivation for not overburdening the system with these messages is so that when there are large discrepancies between the data, the system can use its resources to efficiently process the information instead of the resources being used up by inconsequential messages (Machida, col. 2, lines 45-48).

Regarding claims 29, 59, and 73, Wesley discloses the methods of claims 13 and 47, and the router of claim 61. Although claims 29 and 59 are method claims, claim 73 is a means plus function claim, which contains the method steps of claims 29 and 59. Therefore, since claim 73 is rejectable, claims 29 and 59 must also be rejectable. However, Wesley lacks what Machida discloses "means for calculating an absolute value of a fractional change of said loss rate statistic as compared with a previous loss rate statistic (figure 4, element 52 is used as described generally in col. 2, lines 36-48, although Machida does not explicitly talk about a loss report message Wesley discloses the loss report message, this combined with the concept from Machida is what is being used for claim 28; further the fractional change in data is simply the difference between the currently received data and the previous data, any number (including a difference) can be represented in a fractional way); and means for preventing, in response to said calculated absolute value being less than or equal to a predetermined limit value, transmission of said outgoing loss report message (figure 4, element 56 as described more specifically in col. 6, lines 45-48 where if the difference is smaller than a threshold, then the message is not sent)." It would have been obvious to one with ordinary skill in the art at the time of invention to include the predetermined limit value and comparison of data for the purpose of not having the system become overburdened with messages in response to differences in data even if the differences are minute. The motivation for not overburdening the system with these messages is so that when there are large discrepancies between the data, the system can use its resources to efficiently process

the information instead of the resources being used up by inconsequential messages (Machida, col. 2, lines 45-48).

Response to Arguments

Applicant's arguments, see Remarks, page 24, third paragraph, filed 2 June 2004, with respect to the rejection(s)of claim(s) 1, 6-13, and 18-25 under 35 U.S.C. 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of a better understanding of applicant's invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joshua Kading whose telephone number is (703) 305-0342. The examiner can normally be reached on M-F: 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas Olms can be reached on (703) 305-4703. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Joshua Kading
Examiner
Art Unit 2661

August 13, 2004

KENNETH VANDERPUYE
PRIMARY EXAMINER